

Claims

- [1] An implant assembly for treating proximal femur fractures and same side fractures of shaft of femur comprising;

5

a compact targeting device having connecting end to connect with thigh end of intramedullary nail by temporary connecting bolt, a handle part, block of plural proximal holes and block of plural distal holes, where axis of said proximal holes directed towards head neck and of femur is making an angle of 120° to 140° with longitudinal axis of medullary canal of femur to match the neck shaft angle of femur to target corresponding proximal holes of intramedullary nail and at the same time the plane of said proximal holes is making an angle of 5° to 20° with horizontal plane passing through long axis of femur ,intramedullary nail and said plural distal holes to match the ante version angle of head and neck of femur and axis of said distal locking holes are making an angle of 90 with longitudinal axis of intramedullary nail when said intramedullary nail is in position in medullary canal of femur;

10

15

a unitary intramedullary nail of short version and full length version being adapted in use for insertion into the medullary canal of a femur, is cannulated in whole length ,having thigh end portion or head ,intermediate portion or shaft and knee end portion or tail ,where said head is having plurality of proximal holes and axis of said plural proximal holes directed towards head and neck of femur is making an angle of 120° to 140° with longitudinal axis of medullary canal and said nail to match neck shaft angle of femur and at the same time the plane of said plural proximal holes is making an angle of 5° to 20° with horizontal plane passing through long axis of medullary canal of femur to match ante version angle of head and neck of femur, where said shaft is having plural distal holes to hold distal fragment of femur in said short length version and said knee end is having anterior curvature, and plural distal holes in said full length version and axis of said distal holes is making an angle of 90° with longitudinal axis of

20

25

30

medullary canal and said intramedullary nail when said intramedullary nail is in position in medullary canal;

proximal sliding parallel hip pins are cannulated in whole length having head part, gliding smooth part and triflanged part holding head and neck of femur where said triflanged part is having scalloped three flat equal surfaces up to 15mm to 50 mm of span with mores taper towards leading end to get better grip and rotational stability in head and neck part of proximal fragment of fracture;

an optional buttress plate with or without barrels is having upper short transverse part and lower long vertical part wherein said lower vertical part is having at least two central large holes with at least 2mm of slit to allow continuous sliding contact with said sliding part of proximal sliding hip pins where shape and diameter of said central holes are matching with the shape and diameter of barrels and corresponding said sliding part of said proximal hip pins. wherein purpose of buttress plate is to provide buttress support to lateral cortex of lower part of greater trochanter and lateral cortex of femur when it is broken badly and to have lateral stable platform for limited controlled collapse of fracture gap.

[2] An implant assembly of claim 1 wherein said unitary intramedullary nail of short length version is characterised having anterior curvature in said knee end to match anterior curvature of medullary canal of femur to avoid abutting of tip of said knee end to anterior cortex of femur and prevent stress concentration leading to pointing effect with thigh pain and fracture of shaft of femur later on.

[3] An implant assembly of claim 1 wherein said connecting end of targeting device is characterised by having matching diameter with internally threaded part of said intramedullary nail wherein said targeting device is connected by said cannulated connecting bolt with said intramedullary nail and said targeting device is also short and compact to reduce the size of

incision for insertion of said intramedullary nail and does not obstruct intraoperative fluroscoping viewing even though it is not radiolucent.

5 [4] An implant assembly of claim 1 wherein said block of plurality of proximal holes of targeting device is characterised having axis of said proximal holes is making an angle of 120° to 140° with axis of intramedullary canal of femur to match the neck shaft angle of femur and at the same time plane of said proximal holes is making an angle of 5° to 20° with horizontal plane passing through longitudinal axis of medullary canal of femur to match ante version
10 angle of head and neck of femur and to have placement of said hip pins in centre of neck and head without rotating targeting device.

15 [5] An implant assembly of claim 1 wherein said block of plurality of distal holes of targeting device is characterised having axis of said distal holes is making an angle of 90° with longitudinal axis of intramedullary canal and long axis of said intramedullary nail when said intramedullary nail is in position in medullary canal of femur.

20 [6] An implant assembly of claim 1 wherein said block of plurality of proximal holes and said block of plurality of distal holes of said targeting device are further characterised having their placement in different plane, where plane of said proximal holes is making an angle of 5° to 20° with horizontal plane passing through said distal holes of targeting device.

25 [7] An implant assembly of claim 1 wherein said block of plurality of proximal holes of targeting device is characterised having distance between tip of said connecting end of targeting device and said proximal holes is kept at "X" value and at the same time distance in between said proximal holes is
30 kept at "Y" value. The values of "X" and "Y" in millimeters is kept in such a way that placement of said inferior sliding hip pin happens near calcar for better fixation and said superior sliding hip pin gets placed avoiding superior

surface of neck preventing "cut through" of said sliding hip pin from neck and head of femur.

5 [8] An implant assembly of claim 1 wherein said block of plurality of distal holes of targeting device to be used when said short length version of intramedullary nail is placed in medullary canal is characterised having distance between tip of said connecting end of targeting device and said distal holes of targeting device is kept at "Z" value in millimeters in such a way that said distal holes of targeting device target corresponding said
10 distal locking holes of said intramedullary nail before anterior curvature of femur starts to get sure distal interlocking of said nail with femur without any chance to miss the said distal holes in nail.

15 [9] An implant assembly of claim 1 wherein said unitary intramedullary nail of short length version and long length version are characterised having reducing cross section area and wall thickness of said intramedullary nail gradually from said thigh end portion to said intermediate portion or shaft to said distal knee end portion or tail to match shape of said intramedullary nail implant with shape of intramedullary canal and cortical thickness of femur to
20 avoid high hoop stress in medullary canal while inserting said intramedullary nail.

[10] An implant assembly of claim 1 wherein said unitary intramedullary nail of short length version and long length version are characterised having axis
25 of said knee end and said intermediate portion is concentric with axis of intramedullary canal, while axis of said thigh end or head portion is making an angle of 5° to 9° with axis of intramedullary canal and axis of said knee end and said intermediate portion to allow entry of said intramedullary nail from tip of greater trochanter.

30 [11] An implant assembly of claim 1 wherein said plural proximal holes of intramedullary nail are characterised having axis of said proximal holes are making an angle of 120° to 140° with axis of intramedullary canal of femur

to match the neck shaft angle of femur and at the same time plane of said proximal holes is making an angle of 5° to 20° with horizontal plane passing through longitudinal axis of medullary canal of femur to match ante version angle of head and neck of femur and to have placement of said hip pins in centre of neck and head.

[12] An implant assembly of claim 1 wherein said plural distal holes of intramedullary nail are characterised having axis of said distal holes is making an angle of 90° with longitudinal axis of intramedullary canal and long axis of said intramedullary nail when said intramedullary nail is in position in medullary canal of femur.

[13] An implant assembly of claim 1 wherein said plural proximal holes and said plural distal holes of said intramedullary nail are further characterised having their placement in different plane, where plane of direction of said proximal holes in said intramedullary nail is making an angle of 5° to 20° with horizontal plane passing through direction of said distal holes in said intramedullary nail.

[14] An implant assembly of claim 1 wherein said plural proximal holes of intramedullary nail is characterised having distance between tip of said connecting end of intramedullary nail and said proximal holes is kept at "X1" value and at the same time distance in between said proximal holes is kept at "Y1" value in millimeters in such a way that placement of said inferior sliding hip pin happens near calcar for better fixation and said superior sliding hip pin gets placed avoiding superior surface of neck preventing "cut through" of said sliding hip pin from neck and head of femur

[15] An implant assembly of claim 1 wherein said plural distal holes of said short length version of intramedullary nail is characterised having distance between tip of said connecting end of short length version intramedullary nail and said distal holes is kept at "Z1" value in millimeters in such a way that said distal holes of targeting device target corresponding said distal

locking holes of said short length version intramedullary nail before anterior curvature of femur starts to get sure distal interlocking of said nail with femur without any chance to miss the said distal holes in said nail.

5 [16] An implant assembly of claim 1 wherein said plural proximal holes of intramedullary nail is characterised having other than round shape like said "hexagonal" or said "key hole "and inner diameter matching with shape other than round like said "hexagonal" or said "key" and outer diameter of
10 said sliding part of proximal sliding hip pins to have continuous sliding contact for said sliding proximal hip pins and to have better rotation stability in between said proximal holes acting as barrels and said proximal hip pins for controlled limited collapse of fracture gap.

[17] An implant assembly of claim 1 wherein said intramedullary nail is
15 characterized having relatively smaller diameter of said thigh end.

[18] An implant assembly of claim 1 wherein said triflanged part of proximal sliding hip pin is characterized having scalloped three flat equal surfaces up
20 to 15 mm to 50 mm of span with mores taper towards leading end.

[19] An implant assembly of claim 1 wherein said proximal sliding hip pin is
characterized having said smooth sliding part having outer shape other than
round shape like "hexagonal or "key" and outer diameter matching with
shape and diameter of said proximal holes in intramedullary nail to have
25 continuous sliding contact for said sliding proximal hip pins.

[20] An implant assembly of claim 1 and claim 18 wherein said triflanged part of proximal sliding hip pin is characterised having scalloped three flat equal
surfaces.

30 [21] An implant assembly of claim 1 and claim 18 wherein said triflanged part of proximal sliding hip pin is characterized having said optional multiple holes of at least 2mm diameter connecting said central cannulation of said

proximal hip pin to allow injection of liquid cement or other augmentation material to augment the hold of said proximal hip pin in head and neck of femur.

5 [22] An implant assembly of claim 1 wherein said optional buttress plate is of at least 2 mm thickness, contourable to shape of lower part of greater trochanter and upper part of lateral cortex of femur, is characterised having said upper transverse short part having at least two said holes and said vertical long part having at least two said large central holes of matching in
10 shape and diameter of said sliding part of proximal hip pin where said large central holes are having said slit of at least 2 millimeter and said vertical long part having at least two small holes in lower part.

[23] An implant assembly of claim 1 wherein said variable length cannulated end
15 cap is characterised having said threaded part having outer diameter matching inner diameter of said threaded end of intramedullary nail to seal said nail and having said head part matching outer diameter of said head end of intramedullary nail and said head part is having variable length to enhance the total length of said nail when required.

20 [24] An implant assembly of claim 1 wherein said intramedullary nail and said proximal hip pins are characterized having central cannulation.

[25] An implant assembly of claim 1 wherein said thigh end part or head of said
25 intramedullary nail, said proximal holes in intramedullary nail and said proximal hip pins are characterised having smaller diameter.

[26] An implant assembly for proximal femur fracture as herein described and
30 illustrated in the figures of the accompanying drawings.